

## **Mathematics, Engineering, Science Education (MESA) Program**

### **Improving Teacher Quality**

**Goal Area:** Most mathematics teachers have been faced with the recurring question: “What do I need this for?” School mathematics is taught mostly in the abstract, even though the creation of much of modern mathematics was motivated by applications to science. It is difficult to answer such a question when concepts are taught in isolation from the contexts that give them meaning.

An understanding of how mathematics fits into real world contexts by connecting the data from science class with the functions studied in mathematics class would help both teachers and students anchor mathematical abstractions in reality. Using technology to illustrate these real world connections will only enhance the experience, for both teachers and students, of integrating mathematics and science by illustrating the need for learning mathematics and providing practice (application) of the mathematical concepts.

**Summary:** The MESA program, with a history of more than 30 years of success, has until recently been a student-based program. While parents, teachers and the community have always been an important part of the MESA family, its focus has been to utilize teacher expertise to help students develop their math skills and analytical ability.

Last year, MESA, in conjunction with a variety of teacher professional development programs piloted an institute that helped teachers develop their skills using a curriculum that integrated math and science and used technology as an important teaching tool.

**Purpose:** In order to create an environment in which mathematics and science are *not* taught in isolation, MESA offers a professional development experience for teams of mathematics and science teachers. Using technology as a tool, science teachers develop a greater understanding of how to reinforce the learning of mathematical concepts and mathematics teachers learn about real world application of mathematical concepts. Mathematics-science teacher teams are able to familiarize themselves with common vocabulary. And the mathematics-science-technology institute provides opportunities for mathematics and science teachers to converse about content and pedagogy.

#### **Accomplishments/Results:**

##### **Summer Activity**

The main activity of the professional development institute is a two-week summer experience. The content of the summer institute is based upon rigorous, high level mathematics and science content based on the *California Academic Content Standards*. Technology is used in experiments commonly done in middle school and high school. (For example, electronic data collection and calculator analysis of the data.) The institute experience builds over the course of the two weeks with teacher participants taking on an increasing responsibility role.

##### **Academic Year Follow-up**

Upon completion of the summer institute, teacher participants take part in a series of academic year follow-ups that include additional content presentations, discussions of student work, and the administration of student assessments.

**Plans for the Next 12 Months:** The MESA Mathematics-Science-Technology Institute will begin its second year in the summer. Curriculum is being strengthened taking into account the lessons learned from the pilot year. New partnerships are being forged that will reinforce and strengthen the collaboration already in existence